

What we claim is:

1. A solid structure provided with a frame having struts arranged in a rectangular shape as viewed on a plane and beams extending horizontally and coupling the struts, said frame forming a solid space of substantially a rectangular parallelopiped shape, wherein:

corner struts arranged at the corners of the frame have a polygonal shape in cross section, ends of side beams constituted by H-beams having a web, an upper flange and a lower flange are coupled to the inner side walls of the corner struts, the inner side walls meeting at right angles to each other and facing in the horizontal direction along the side edges of the frame meeting at right angles to each other;

a plurality of pairs of first internally threaded members are buried between the inner side wall which is one of the inner side walls of the corner strut and the outer side wall positioned on the side opposite to the one inner side wall maintaining a distance in the up-and-down direction, the plurality of first internally threaded members extending in parallel at the same height maintaining a distance in the horizontal direction and forming internally threaded holes at one end thereof in a manner that the internally threaded holes are opened in the outer surface of the one inner side wall, and a pair of through holes are formed in each pair of the first internally threaded members maintaining a distance in the axial direction, meeting the axes horizontally at right angles, and extending in parallel with each other;

a plurality of pairs of second internally threaded members are buried between the other inner side wall which is one of the inner side walls of the corner strut and the other outer side wall positioned on the side opposite to the other inner side wall maintaining a distance in the up-and-down

direction, the plurality of second internally threaded members having axes common to the pair of axes of the through holes formed in each pair of the first internally threaded members and forming internally threaded holes at one end thereof in 5 a manner to penetrate through the through holes of the corresponding pair of the first internally threaded members and so as to be opened in the other inner side wall;

10 rectangular coupling plates are secured to the ends of the side beams at right angles with the side beams coupled to the corner strut, and a plurality of mounting holes are formed in the coupling plates on each side divided by the web maintaining a distance in the up-and-down direction;

15 the one side beam has the coupling plate that is substantially brought into contact with the one inner side wall of the corner strut in a manner that the mounting holes of the coupling plate are in alignment with the internally threaded holes of the pairs of the first internally threaded members opened in the one inner side wall of the corner strut, and is detachably fastened to the one inner side wall of the corner 20 strut by bringing the bolts into engagement with the internally threaded holes through the mounting holes; and

25 the other side beam has the coupling plate that is substantially brought into contact with the other inner side wall of the corner strut in a manner that the mounting holes of the coupling plate are in alignment with the internally threaded holes of the pairs of the second internally threaded members opened in the other inner side wall of the corner strut, and is detachably fastened to the other inner side wall of the corner strut by bringing the bolts into engagement with the 30 internally threaded holes through the mounting holes.

2. A solid structure provided with a frame having struts arranged in a rectangular shape as viewed on a plane and beams

extending horizontally and coupling the struts, said frame forming a solid space of substantially a rectangular parallelopiped shape, wherein:

side struts arranged between the corner struts arranged  
5 at the corners of the frame have a polygonal shape in cross section, ends of side beams constituted by H-beams having a web, an upper flange and a lower flange are coupled to the side walls of the side struts, the side walls facing in a horizontal direction along the side edges of the frame;

10 a plurality of pairs of internally threaded members are buried between the side walls of the side struts maintaining a distance in the up-and-down direction, the plurality of internally threaded members extending in parallel at the same height maintaining a distance in the horizontal direction and  
15 having internally threaded holes at both ends thereof in a manner that the internally threaded holes are opened in the corresponding side walls;

20 rectangular coupling plates are secured to the ends of the side beams at right angles with the side beams, and a plurality of mounting holes are formed in the coupling plates on either side divided by the web maintaining a distance in the up-and-down direction;

25 the one side beam has the coupling plate that is substantially brought into contact with the one side wall of the side strut in a manner that the mounting holes of the coupling plate are in alignment with the internally threaded holes opened in the one side wall of the side strut, and is detachably fastened to the one side wall of the side strut by bringing the bolts into engagement with the internally  
30 threaded holes of the internally threaded members through the mounting holes; and

the other side beam has the coupling plate that is substantially brought into contact with the other side wall

of the side strut in a manner that the mounting holes of the coupling plate are in alignment with the internally threaded holes opened in the other side wall of the side strut, and is detachably fastened to the other side wall of the side strut

5 by bringing the bolts into engagement with the internally threaded holes of the internally threaded members through the mounting holes.

3. A solid structure according to claim 1, wherein the upper  
10 surfaces of the side beams are positioned substantially at the same height.

4. A solid structure according to claim 3, wherein the side beams have substantially the same shape and the same size in  
15 cross section.

5. A solid structure provided with a frame having struts arranged in a rectangular shape as viewed on a plane and beams extending horizontally and coupling the struts, said frame  
20 forming a solid space of substantially a rectangular parallelopiped shape, wherein:

side struts arranged between the corner struts arranged at the corners of the frame have a polygonal shape in cross section, ends of one inner side beam and of two side beams  
25 constituted by H-beams having a web, an upper flange and a lower flange are coupled to the inner side walls of the side struts facing the inside of the solid space of the frame and to the side walls thereof facing in the horizontal direction along the side edges of the frame;

30 a plurality of pairs of first internally threaded members are buried between the side walls of the side struts maintaining a distance in the up-and-down direction, the plurality of first internally threaded members extending in parallel at the same

height maintaining a distance in the horizontal direction and having internally threaded holes at both end thereof in a manner that the internally threaded holes are opened in the side walls, and a pair of through holes are formed in each pair of the first 5 internally threaded members maintaining a distance in the axial direction, meeting the axes horizontally at right angles, and extending in parallel with each other;

a plurality of pairs of second internally threaded members are buried between the inner side wall of the side strut 10 and the outer side wall positioned on the side opposite to the inner side wall having axes common to the pair of axes of the through holes formed in each pair of the first internally threaded members and forming internally threaded holes at one end thereof in a manner to penetrate through the corresponding 15 pair of through holes of the first internally threaded members and so as to be opened in the inner side wall;

rectangular coupling plates are secured to the ends of the inner side beam and of the side beams at right angles with the inner side beam and with the side beams coupled to the side 20 strut, and a plurality of mounting holes are formed in the coupling plates on each side divided by the web maintaining a distance in the up-and-down direction;

the one side beam has the coupling plate that is substantially brought into contact with the one side wall of 25 the side strut in a manner that the mounting holes of the coupling plate are in alignment with the internally threaded holes opened in one side wall of the side strut, and is detachably fastened to the one side wall of the side strut by bringing the bolts into engagement with the internally 30 threaded holes on one side of the pairs of the first internally threaded members through the mounting holes;

the other side beam has the coupling plate that is substantially brought into contact with the other side wall

of the side strut in a manner that the mounting holes of the coupling plate are in alignment with the internally threaded holes opened in the other side wall of the side strut, and is detachably fastened to the other side wall of the side strut  
5 by bringing the bolts into engagement with the other internally threaded holes of the pairs of the first internally threaded members through the mounting holes; and

the inner side beam has the coupling plate that is substantially brought into contact with the inner side wall  
10 of the side strut in a manner that the mounting holes of the coupling plate are in alignment with the internally threaded holes opened in the inner side wall of the side strut, and is detachably fastened to the inner side wall of the side strut by bringing the bolts into engagement with the internally  
15 threaded holes of the pairs of the second internally threaded members through the mounting holes.

6. A solid structure according to claim 5, wherein the upper surfaces of the inner side beam and of the side beams are  
20 positioned substantially at the same height.

7. A solid structure according to claim 6, wherein the inner side beam and the side beams have substantially the same shape and the same size in cross section.

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8. A solid structure according to claim 1, wherein the corner struts and the side struts are constituted by metallic pipes having a square shape in cross section, and the internally threaded members are made of a metal and are inserted and  
30 secured by welding in the through holes formed in the corner struts and in the side struts.

9. A solid structure provided with a frame having struts

arranged in a rectangular shape as viewed on a plane and beams extending horizontally and coupling the struts, said frame forming a solid space of substantially a rectangular parallelopiped shape, wherein:

5 at least the upper ends of the corner struts arranged at the corners of the frame are constituted by polygonal metallic pipes, ends of the upper side beam made of a metallic pipe having a square shape in cross section are coupled to the inner side walls at the upper end of the corner strut meeting  
10 at right angles with each other, the inner side surfaces facing in the horizontal direction along the side edges meeting at right angles of the frame;

15 a pair of mounting holes are formed at the upper ends of the one inner side wall and of the other inner side wall of the corner strut at the same height maintaining a distance in the horizontal direction;

20 rectangular coupling plates are secured to the ends of the upper side beams at right angles with the upper side beams coupled to the corner strut, and a pair of internally threaded holes are formed in the coupling plates maintaining a distance in the horizontal direction;

25 the one upper side beam has the coupling plate that is substantially brought into contact with the one inner side wall of the corner strut in a manner that the internally threaded holes of the coupling plates are in alignment with the mounting holes in one side wall of the corner strut, and is detachably fastened to the one inner side wall of the corner strut by bringing the bolts into engagement with the internally threaded holes from the upper open end of the corner strut  
30 through the mounting holes; and

the other upper side beam has the coupling plate that is substantially brought into contact with the other inner side wall of the corner strut in a manner that the internally

threaded holes of the coupling plates are in alignment with the mounting holes in the other side wall of the corner strut, and is detachably fastened to the other inner side wall of the corner strut by bringing the bolts into engagement with the

5 internally threaded holes from the upper open end of the corner strut through the mounting holes.

10. A solid structure according to claim 9, wherein the upper surfaces of the corner strut and of the upper side beams are  
10 positioned substantially at the same height.

11. A solid structure according to claim 10, wherein the upper side beams have substantially the same shape and the same size in cross section.

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12. A solid structure provided with a frame having struts arranged in a rectangular shape as viewed on a plane and beams extending horizontally and coupling the struts, said frame forming a solid space of substantially a rectangular  
20 parallelopiped shape, wherein:

at least the upper ends of the side struts arranged between the corner struts arranged at the corners of the frame are made of metallic pipes having a polygonal shape in cross section, an end of an upper side beam constituted by an H-  
25 beam having a web, an upper flange and a lower flange is coupled to the inner side wall at the upper end of the side strut, the side wall facing the inside of the solid space of the frame, and the ends of the upper side beam made of a metallic pipe having a square shape in cross section are coupled to the side  
30 walls at the upper end of the side strut, the side walls facing in the horizontal direction along the side edges of the frames;

a plurality of pairs of internally threaded members are buried between the inner side wall of the side strut and the

outer side wall positioned on the side opposite to the inner side wall at the same height in parallel maintaining a distance in the horizontal direction, the plurality of internally threaded members having the internally threaded holes that are 5 opened in the inner side wall;

a pair of mounting holes are formed at the same height maintaining a distance in the horizontal direction at the upper ends of the side walls of the side strut at positions higher than the internal threaded members;

10 rectangular coupling plates are secured to the ends of the upper inner side beams at right angles with the upper inner side beams which are coupled to the upper ends of the inner side walls of the side struts, and a plurality of mounting holes are formed in the coupling plates on either side divided by 15 the web maintaining a distance in the up-and-down direction;

rectangular coupling plates are secured to the ends of the upper side beams at right angles with the upper side beams which are coupled to the side walls at the upper ends of the side struts, and a pair of internally threaded holes are formed 20 in the coupling plate at the same height maintaining a distance in the up-and-down direction;

the upper inner side beam has the coupling plate that is substantially brought into contact with the inner side wall of the side strut in a manner that the mounting holes of the 25 coupling plate are in alignment with the internally threaded holes opened in the inner side wall of the side strut, and is detachably fastened to the inner side wall of the side strut by bringing the bolts into engagement with the internally threaded holes of the pairs of the internally threaded members 30 through the mounting holes;

the one upper side beam has the coupling plate that is substantially brought into contact with the one side wall of the side strut in a manner that the internally threaded holes

of the coupling plate are in alignment with the mounting holes in one side wall of the side strut, and is detachably fastened to the one side wall of the side strut by bringing the bolts into engagement with the internally threaded holes through the 5 mounting holes; and

the other upper side beam has the coupling plate that is substantially brought into contact with the other side wall of the side strut in a manner that the internally threaded holes of the coupling plate are in alignment with the mounting holes 10 in the other side wall of the side strut, and is detachably fastened to the other side wall of the side strut by bringing the bolts into engagement with the internally threaded holes through the mounting holes.

15 13. A solid structure according to claim 12, wherein the upper surfaces of the upper side beams and of the upper inner side beam are positioned substantially at the same height.

20 14. A solid structure according to claim 13, wherein the upper side beams have substantially the same shape and the same size in cross section.

15. A solid structure provided with a frame having struts 25 arranged in a rectangular shape as viewed on a plane and beams extending horizontally and coupling the struts, said frame forming a solid space of substantially a rectangular parallelopiped shape, wherein:

30 one or a plurality of rectangular side edge spaces are formed in each of a plurality of side edge regions formed in the frame, the one or the plurality of spaces being surrounded by a pair of side beams facing each other in the up-and-down direction and by a pair of struts facing each other in a

horizontal direction, and one or a plurality of rectangular side wall units are fitted to all side edge spaces or to at least all side edge spaces excluding the one in the frame;

5       hollow mounting members are integrally arranged at the corners of the side wall unit and at the side edges, the hollow mounting members having a square shape in cross section and being constituted by four side walls having a predetermined thickness and a width in the axial direction, and the hollow mounting members being so arranged that the axes thereof are  
10      directed to both surfaces of the side wall unit;

15      mounting holes are formed in the two side walls facing outward of the side wall unit, the two side walls meeting at right angles with each other in the hollow mounting members arranged at the corners of the side wall unit, and mounting holes are formed in one side wall facing outward of the side wall unit in the hollow mounting members arranged at the side edges of the side wall unit;

20      internally threaded members forming threaded holes at an end thereof are arranged in the pair of side beams and in the pair of struts defining the side edge space at positions corresponding to the mounting holes of the hollow mounting members in one or a plurality of side wall units fitted to the side edge space, the hollow mounting members facing the pair of side beams and the pair of struts in a manner that the  
25      internally threaded holes are opened in the side edge space, wherein when the side wall unit is fitted into the side edge space, the mounting holes of the hollow mounting members are brought into alignment with the internally threaded holes of the corresponding internally threaded members, and in this  
30      state, the side wall unit is detachably fastened to the pair of side beams and to the pair of struts by bringing the bolts into engagement with the internally threaded holes of the corresponding internally threaded members through the

mounting holes.

16. A solid structure according to claim 15, wherein the two side walls meeting at right angles of the hollow mounting member  
5 arranged at a corner of the side wall unit or the two side walls facing outward of the side wall unit, define a portion of the side walls of the side wall unit meeting at right angles at the corner of the side wall unit; and one side wall of the hollow mounting member arranged along the side edge of the side wall  
10 unit or the one side wall facing outward of the side wall unit, defines a portion of the side wall along the side edge of the side wall unit.

17. A solid structure according to claim 15, wherein the side wall unit includes two side frames extending at right angles along the two side edges from the hollow mounting member arranged at a corner, and brace frames extending aslant relative to the two side frames; and a substantially right-angled triangle is formed by two side frames and by the  
20 brace frames as viewing the side wall unit on a plane.

18. A solid structure according to claim 15, wherein the hollow mounting members are formed by cutting a square metallic pipe which is a common part.

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19. A solid structure according to claim 15, wherein the hollow mounting members are integrally made of cast iron that can be welded, braces are provided at four corners of each hollow mounting member spanning across the two side walls that  
30 are meeting at right angles with each other, the brace has a predetermined thickness and a width in the axial direction same as that of the two side walls, and the brace forms a right-angled triangle relative to the two side walls as viewing the hollow

mounting members in the axial direction.

20. A solid structure according to claim 15, wherein the upper side beam and the pair of struts defining the side edge space are constituted by metallic pips having a square shape in cross section, and the internally threaded members are made of a metal and are inserted in the through holes formed in the upper side beam and in the pair of struts and are secured therein by welding.

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21. A solid structure according to claim 15, wherein the lower side beam defining the side edge space is constituted by an H-beam having a web, an upper flange and a lower flange; mounting holes are formed in the lower side beam at positions corresponding to the mounting holes of the hollow mounting members of the side wall unit, the mounting holes being in concentric with the axis that passes through the center of the web in the direction of width and meets the upper and lower flanges at right angles, and the mounting holes extending from the upper surface of the upper flange up to the upper end of the web; and the internally threaded members are inserted in the corresponding mounting holes in a manner that the internally threaded holes are opened in the upper surface of the upper flange and are secured therein by welding.

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22. A solid structure according to claim 15, wherein a plurality of side wall units are fitted into the side edge space so as to be neighboring each other; in the side wall units neighboring each other, the side walls of the hollow mounting members constituting a portion of side walls facing each other are so positioned as to be opposed to each other in a manner that the mounting holes thereof are aligned to each other; and the side wall units neighboring each other are detachably

fastened together by inserting the bolts in the aligned mounting holes of the hollow mounting members that are opposed to each other and engaging nuts therewith.

5 23. A solid structure provided with a frame having struts arranged in a rectangular shape as viewed on a plane and beams extending horizontally and coupling the struts, said frame forming a solid space of substantially a rectangular parallelopiped shape, wherein:

10 the frame has a plurality of rectangular floor spaces surrounded by four beams, a rectangular floor unit is mounted on each floor space, the peripheral edges of the floor unit are constituted by frame members having a vertical wall and a flange extending outward from the upper end of the vertical  
15 wall at right angles, and each floor unit is fitted to the floor space from the upper side, the peripheral flanges are placed on the upper surfaces of the four beams defining the floor space, and the vertical walls are detachably fastened to the corresponding beams by using bolts and internally threaded  
20 members.

24. A solid structure according to claim 23, wherein the four beams defining the floor spaces are constituted by H-beams having a web, an upper flange and a lower flange; the support plates are secured by welding between the opposing ends of the upper flange and the lower flange at portions where the floor units are coupled to the four beams; internally threaded members forming internally threaded holes at one end thereof are secured by welding between the support plates and the side surface of the web in a manner that the internally threaded holes are opened in the outer surface of the support plates; mounting holes are formed in the vertical walls of the floor units so as to be corresponded to the internally threaded holes

of the internally threaded members; and the floor units are detachably fastened to the four beams defining the corresponding floor spaces by bringing the bolts into engagement with the internally threaded holes of the

5 internally threaded members through the mounting holes in a state where the floor units are fitted into the corresponding floor spaces from the upper side.

25. A solid structure provided with a frame having struts  
10 arranged in a rectangular shape as viewed on a plane and beams  
extending horizontally and coupling the struts, said frame  
forming a solid space of substantially a rectangular  
parallelopiped shape, wherein:

the frame includes upper side beams that couple the upper  
15 ends of the struts facing each other and define rectangular  
peripheral edges together with the struts as viewed on a plane,  
and a rectangular upper space surrounded by the struts and by  
the upper side beams;

20 a plurality of rectangular roof units are mounted on the  
upper ends of the frame so as to cover the upper space from  
the upper side;

end-engaging flange means are arranged on the lower  
surfaces at both ends in the lengthwise direction of the roof  
units hanging down from the lower surfaces;

25 the roof units are mounted at their both ends on at least  
one upper side beam defining a pair of side edges that are facing  
each other of the frame; and

30 the end-engaging flange means are positioned being  
overlapped on the inner sides and/or on the outer sides of the  
corresponding upper side beams and are detachably fastened by  
bolts and internally threaded members, so that the roof units  
neighboring each other cover the upper space from the upper  
side.

26. A solid structure according to claim 25, wherein each end-engaging flange means comprises an end-engaging flange hanging down from the lower surfaces at both ends in the

5 lengthwise direction of the roof unit or comprises a pair of end-engaging flanges hanging down from the lower surfaces at both ends in the lengthwise direction of the roof unit and are extending in parallel in the direction of width maintaining a distance in the lengthwise direction.

10 27. A solid structure according to claim 25, wherein one side-engaging flange means is hanging down from the lower surface on one side in the direction of width of the roof unit of the one side and is extending in the lengthwise direction, the roof unit of the one side being positioned on one side in

15 a direction which is in agreement with the direction of width of the roof units in the upper space; the roof unit of the one side is positioned with its one side-engaging flange means being overlapped on the inner side and/or the outer side of at least one upper side beam that defines the one side edge

20 of the another pair of side edges facing each other of the frame and is detachably fastened by bolts and internally threaded members; the other side-engaging flange means is hanging down from the lower surface on the other side of the roof unit of the other side in the direction of width and is extending in

25 the lengthwise direction, the roof unit of the other side being positioned on other side in a direction which is in agreement with the direction of width of the roof units in the upper space; and the roof unit of the other side is positioned with its other side-engaging flange means being overlapped on the inner side

30 and/or the outer side of at least one upper side beam that defines the other side edge of the another pair of side edges facing each other of the frame and is detachably fastened by bolts and internally threaded members.

28. A solid structure according to claim 27, wherein the one side-engaging flange means comprises a one side-engaging flange hanging down from the lower surface on one side of the 5 roof unit in the direction of width or a pair of one side-engaging flanges hanging down from the lower surface thereof on one side in the direction of width and are extending in parallel in the lengthwise direction maintaining a distance in the direction of width; and the other side-engaging flange 10 means comprises an other side-engaging flange hanging down from the lower surface on the other side of the roof unit in the direction of width or a pair of other side-engaging flanges hanging down from the lower surface thereof on the other side in the direction of width and are extending in parallel in the 15 lengthwise direction maintaining a distance in the direction of width.

29. A solid structure according to claim 25, wherein a ceiling panel member is arranged on the lower surfaces of the 20 roof units and at least on the inner region of the end-engaging flange means, or on the lower surface of the roof unit of the one side and on at least the inner regions of the end-engaging flange means and of the one side-engaging flange means, or on the lower surface of the roof unit of the other side and on 25 at least the inner regions of the end-engaging flange means and of the other side-engaging flange means.

30. A solid structure according to claim 25, wherein the roof unit comprises:

30 channel plates that are arranged in a rectangular shape to define the peripheral edges and having open ends that are directed inward, the channel plates having a vertical wall and an upper flange and a lower flange that are folded at right

angles toward the insides from the upper end and the lower end of the vertical wall;

transverse beams arranged between the vertical walls of the channel plates facing each other in the direction of width of the roof unit maintaining a distance in the lengthwise direction of the roof unit in a manner that the height thereof gradually increases from a position close to one end of the roof unit up to a position close to the other end in the lengthwise direction;

10 a trough member arranged at one end in the lengthwise direction of the roof unit, stretching between the vertical walls of the channel plates facing each other in the direction of width of the roof unit, and having a drain port formed in the bottom thereof; and

15 at least one roof plate mounted on the transverse beams so as to extend from the other end up to the one end in the lengthwise direction of the roof unit in a manner of being inclined downward, the end of the roof plate having the smallest height in the lengthwise direction being positioned on the 20 trough member.

31. A solid structure according to claim 25, wherein the roof unit comprises:

channel plates that are arranged in a rectangular shape 25 to define the peripheral edges and having open ends that are directed inward, the channel plates having a vertical wall and an upper flange and a lower flange that are folded at right angles toward the insides from the upper end and the lower end of the vertical wall;

30 transverse beams arranged between the vertical walls of the channel plates facing each other in the direction of width of the roof unit maintaining a distance in the lengthwise direction of the roof unit in a manner that the height thereof

gradually increases from a position close to one end and from a position close to the other end of the roof unit in the lengthwise direction up to a central position of the roof unit in the lengthwise direction;

5       trough members arranged at one end and at the other end in the lengthwise direction of the roof unit, stretching between the vertical walls of the channel plates facing each other in the direction of width of the roof unit, and having drain ports formed in the bottoms thereof; and

10       at least one roof plate of the one side mounted on the transverse beams so as to extend from the center to the one end of the roof unit in the lengthwise direction in a manner of being inclined downward, and at least one roof plate of the other side mounted on the transverse beams so as to extend from 15 the center to the other end of the roof unit in the lengthwise direction in a manner of being inclined downward, the lower end of the roof plate of the one side having the smallest height in the lengthwise direction and the lower end of the other roof plate having the smallest height in the lengthwise direction 20 being positioned on the corresponding trough members.

32.       A solid structure according to claim 31, wherein the one side edge in the direction of width of the roof unit of the one side is positioned midway in the direction of width of at 25 least one upper side beam defining the one side edge of the other pair of side edges facing each other of the frame, and midway in the direction of width of the struts positioned on the extensions of the upper side beams, the roof unit of the one side being positioned on the one side in the direction in 30 agreement with the direction of width of the roof units in the upper space; the other side of the trough unit of the one side of a rectangular shape on a plane having a drain port in the bottom is detachably attached to the one side of the roof unit

of the one side in the direction of width; and the trough unit of the one side includes a channel plate arranged in a rectangular shape having a length nearly equal to the roof unit of the one side in the lengthwise direction and having an open 5 end facing inward, the channel plate being constituted by a vertical wall, and an upper flange and a lower flange folded inward at right angles from the upper end and the lower end of the vertical wall, and a trough member that extends between the vertical walls of the channel plate facing in the lengthwise 10 direction of the trough unit of the one side and having a drain port in the bottom thereof.

33. A solid structure according to claim 32, wherein the height of the channel plate defining the other side in the 15 direction of width of the trough unit of the one side is selected to be substantially the same as the height of the channel plate defining the one side in the direction of width of the roof unit of the one side; a mounting member having a mounting piece is secured to the channel plate defining the other side in the 20 direction of width of the trough unit of the one side, the mounting piece hanging down from the lower surface of the channel plate; the trough unit of the one side has the outer surface of the vertical wall of the channel plate defining the other side in the direction of width of the trough unit of the 25 one side that is overlapped on the outer surface of the vertical wall of the channel plate defining the one side in the direction of width of the roof unit of the one side, and is detachably fastened by using bolts and nuts; the bottom surface of the channel plate defining the other side in the direction of width 30 of the trough unit of the one side is placed on the upper surfaces of the upper side beams and of the struts; and the mounting piece is overlapped on the outer side walls of the upper side beams and of the struts, and is detachable fastened

to the upper side beams by using bolts and internally threaded members.

34. A solid structure according to claim 31, wherein the  
5 other side edge in the direction of width of the roof unit of  
the other side is positioned midway in the direction of width  
of at least one upper side beam defining the other side edge  
of the other pair of side edges facing each other of the frame,  
and midway in the direction of width of the struts positioned  
10 on the extensions of the upper side beams, the roof unit of  
the other side being positioned on the other side in the  
direction in agreement with the direction of width of the roof  
units in the upper space; the one side of the trough unit of  
the other side of a rectangular shape on a plane having a drain  
15 port in the bottom is detachably attached to the other side  
of the roof unit of the other side in the direction of width;  
and the trough unit of the other side includes a channel plate  
arranged in a rectangular shape having a length nearly equal  
to the roof unit of the other side in the lengthwise direction  
20 and having an open end facing inward, the channel plate being  
constituted by a vertical wall, and an upper flange and a lower  
flange folded inward at right angles from the upper end and  
the lower end of the vertical wall, and a trough member that  
extends between the vertical walls of the channel plate facing  
25 in the lengthwise direction of the trough unit of the other  
side and having a drain port in the bottom thereof.

35. A solid structure according to claim 34, wherein the  
height of the channel plate defining the one side in the  
30 direction of width of the trough unit of the other side is  
selected to be substantially the same as the height of the  
channel plate defining the other side in the direction of width  
of the trough unit of the other side; a mounting member having

a mounting piece is secured to the channel plate defining the one side in the direction of width of the trough unit of the other side, the mounting piece hanging down from the lower surface of the channel plate; the trough unit of the other side

5 has the outer surface of the vertical wall of the channel plate defining the one side in the direction of width of the trough unit of the other side that is overlapped on the outer surface of the vertical wall of the channel plate defining the other side in the direction of width of the roof unit of the other

10 side, and is detachably fastened by using bolts and nuts; the bottom surface of the channel plate defining the one side in the direction of width of the trough unit of the other side is placed on the upper surfaces of the upper side beams and of the struts; and the mounting piece is overlapped on the outer

15 side walls of the upper side beams and of the struts, and is detachably fastened to the upper side beams by using bolts and internally threaded members.

36. A solid structure according to claim 26, wherein

20 internally threaded members extending in a horizontal direction and forming internally threaded holes at the one end and/or the other end thereof, are buried in the portions of the upper side beams defining the pair of side edges facing each other of the frame coupled to the roof units, in a manner

25 that the internally threaded holes are opened in the inner side walls and/or the outer side walls of the corresponding upper side beams facing the upper space; mounting holes are formed in an end-engaging flange or in one or both of a pair of the end-engaging flanges arranged at both ends of the roof units

30 in the lengthwise direction so as to be corresponded to the internally threaded members; and the one end-engaging flange or the pair of end-engaging flanges of the roof units are detachably fastened to the inner side walls and/or the outer

side walls of the corresponding upper side beams by bringing the bolts into engagement with the threaded holes of the corresponding internally threaded members through the mounting piece.

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37. A solid structure according to claim 27, wherein internally threaded members extending in a horizontal direction and forming internally threaded holes at the one end and/or the other end thereof, are buried in the portions of 10 the upper side beams defining the other pair of side edges facing each other of the frame coupled to the roof unit of the one side or to the roof unit of the other side, in a manner that the internally threaded holes are opened in the inner side walls and/or the outer side walls of the corresponding upper 15 side beams facing the upper space; mounting holes are formed in a one side-engaging flange or in one or both of a pair of the one side-engaging flanges arranged on one side of the roof unit of the one side and in an other side-engaging flange or in one or both of a pair of the other side-engaging flanges 20 arranged on the other side of the roof unit of the other side so as to be corresponded to the internally threaded members; and the one side-engaging flange or one or both of the pair of the one side-engaging flanges and the other side-engaging flange or one or both of the pair of the other side-engaging 25 flanges are detachably fastened to the inner side walls and/or the outer side walls of the corresponding upper side beams by bringing the bolts into engagement with the threaded holes of the corresponding internally threaded members through the mounting piece.

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38. A solid structure according to claim 33, wherein internally threaded members extending in a horizontal direction and forming internally threaded holes at the one end

thereof, are buried in the portions of the upper side beams coupled to the trough unit of the one side and to the trough unit of the other side, in a manner that the internally threaded holes are opened in the outer side walls of the corresponding

5 upper side beams; mounting holes are formed in the mounting pieces of the channel plates defining the other side in the direction of width of the trough unit of the one side and defining the one side in the direction of width of the trough unit of the other side; and the mounting pieces are secured

10 to the outer side walls of the upper side beams by bringing the bolts into engagement with the threaded holes of the corresponding internally threaded members through the mounting pieces.

15 39. A solid structure according to claim 36, wherein the upper side beams are constituted by metallic pipes having a square shape in cross section, and the internally threaded members are made of a metal and are inserted in the through holes formed in the upper side beams and are secured therein by welding.

20

40. A solid structure according to claim 30, wherein a seal plate member is detachably mounted on the upper end between the vertical walls of the channel plates facing each other of

25 the roof units neighboring each other, the seal plate member being made of a metal having elasticity and including a flat plate-like sealing substrate having a predetermined width, both end flanges extending from both ends of the sealing substrate in the direction of width into the side of one surface

30 at right angles with the one surface, and a central flange extending from the center of the sealing substrate in the direction of width into the side of one surface at right angles with the one surface; the distance between the central flange

and both end flanges is slightly larger than the width of the upper flanges of the channel plates facing each other of the roof units neighboring each other; the channel plates are fastened together by bolts and nuts in a state where the central  
5 flange of the seal plate member is inserted from the upper side into between the vertical walls of the channel plates facing each other and where the sealing substrate is placed on the upper surfaces of the upper flanges of the channel plates in the neighboring roof units; and both end flanges of the seal  
10 plate member are folded in the directions to approach each other with the ends of the upper flanges of the channel plates as fulcrums.

41. A solid structure according to claim 1, wherein the frame  
15 is constituted by detachably fastening the struts and the beams together all by using bolts and internally threaded members, or is constituted by detachably fastening the struts and the beams together, and the beams and the beams together all by using bolts and internally threaded members.